RESEARCH ARTICLE

Application of cloud storage video surveillance processing technology in monitoring the psychological impact of physical exercise on college students

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With the deepening of the centralization of monitoring systems, storage devices have gradually migrated from edge locations to the center and occupy an increasingly large proportion of the system. By introducing cloud storage technology, this study established a massive video database to provide a unified cloud storage service interface to support the effective integration of campus business systems and teaching comprehensive management business systems, making the video cloud storage center an indispensable core resource support platform for various business systems. Further, the dynamic cost replacement (DCR) algorithm was used to efficiently and quickly allocate services, which not only focused on providing efficient and fast allocation services for volume requests but also emphasized maintaining high service quality. Meanwhile, the numbers of backend storage nodes were minimized to achieve maximum resource utilization and minimum cost. A total of 120 students from multiple universities were involved in this research with the 72 males and 48 females and age range of 19 to 23. The PHQ-9 depression screening scale was applied in this study to assess students' mental health status by evaluating the scores of anxieties and depression. Student behavioral health data were collected through various systems on campus. The results showed that the optimization rate of the DCR algorithm for the whole system could be maintained at about 45.33% when the data access was relatively uniform. The concept and technology of cloud storage were introduced to widely collect data on various phenomena of college students' psychological crisis. The psychological performance of college students in a certain region through inter-school data sharing was analyzed and explained, which provided targeted intervention plans and research judgments. Based on the results, a suitable cloud storage prototype system was designed to achieve personalized emergency response for students' psychological crises.

Keywords: cloud storage; college student; mental health; physical exercise; psychological monitoring; video surveillance.

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Introduction

Cloud storage refers to a data storage model that aggregates a large number of heterogeneous storage devices, applications, and services through the network, encapsulates storage resources into independent virtual storage resource pools through virtualization technology, and provides users with on-demand service. It is not just a simple data storage warehouse, but a comprehensive system that integrates multiple functions such as data management and data migration. In cloud computing architecture, cloud storage system is the core of data storage and management, providing stable, reliable, and scalable data support for upper-level applications

[1]. With the rapid development of high-definition applications of video surveillance systems, users' demands on the data to be stored in the video surveillance system and the complexity of applications are constantly increasing, and the need to apply video big data in the field of security is imminent [2]. Video surveillance systems need huge storage capacity and face huge network communication bandwidth pressure. The application of peer-to-peer (P2P) technology opens a new distributed storage pattern in video surveillance data management [3]. The purpose of a P2P distributed storage system is to integrate the idle network resources of the end system through the internet to achieve large-scale file sharing and storage. Studying and life during university are not only the beginning of a new stage but also a very important turning point in student life [4]. Physical exercise as one of the effective ways to promote physical and mental health cannot be ignored in regulating psychological state and improving psychological quality. Moderate physical exercise can release stress hormones in the body, promote the secretion of "pleasure substances" such as endorphins in the brain, and effectively alleviate negative emotions such as anxiety and depression [5]. In addition, physical exercise can enhance an individual's self-efficacy and improve the ability to cope with stress, therefore promoting the harmonious development of interpersonal relationships and having a positive effect on maintaining and improving the mental health level of college students [6]. In this context, integrating physical exercise into daily teaching and management is particularly important to promote the mental health of college students. Physical exercise not only directly affects psychological states through physiological mechanisms such as releasing stress and enhancing emotions, but also subtly shapes resilient willpower and improves social skills [7]. Therefore, conducting in-depth research on the positive impact of physical exercise on the psychology of college students and designing scientific exercise programs and courses based on this are important in the current education field.

To ensure the effective implementation and continuous optimization of these intervention measures, it is particularly important to strengthen the monitoring and evaluation of the psychological impact of physical exercise on college students [8], which requires the focusing on the immediate effects of physical exercises and exploring its long-term impact on student's mental health through long-term tracking research. Although introducing advanced technology such as video surveillance processing technology can provide objective data support to a certain extent, it should be used with caution to ensure that relevant information is collected and analyzed reasonably and effectively while respecting students' privacy [9]. Among various data types, structured data is the easiest one to extract information value, while the extraction of unstructured data represented by video data is very difficult [10]. In the whole big data system, the storage system is at the bottom layer, which retains a large amount of unanalyzed basic data. Therefore, the optimization of cloud storage in the big data environment also lies in the cooperation and support with other systems [11, 13]. Schislyaeva *et al*. put forward the concept of public audit that could be used for third-party verification in various systems and security models and combined homomorphic authenticator and random mask to realize data integrity verification under privacy protection [14]. In cloud data integrity verification, Han adopted the method of randomly extracting data blocks and found that, when the file corruption rate was at least 1.5%, an error detection accuracy was 99.2%, and the validation end only needed to extract 398 data blocks [15]. Rao suggested that cloud storage attracted more and more users with its low cost, high reliability, flexibility, and pay-as-you-need mode and solved the problem of massive data storage from the perspective of data volume [16]. Tong comprehensively considered the storage cost and transmission cost of data copies and put forward the corresponding storage cost model and the lowest cost copy management strategy [17]. The scientist also believed that, as a data storage center for massive data, storage resources were integrated into a large storage system through the cloud, and more attention should be paid to the management ability of high-definition video itself, which should have a safe and reliable data protection mechanism [18]. Philipson proposed that data access and management for users could be completed by using a virtual desktop and other access methods, and the huge storage capacity composed of various forms of storage devices was only a single storage pool in the view of the user [19]. Wang *et al*. emphasized that the use of cloud storage systems could play a customized role in monitoring video images for different applications, achieving unified integration in the cloud storage system, reducing unnecessary consumption of system resources, and simplifying the video image storage structure [20].

Exercise can stimulate the release of neurotransmitters such as endorphins and dopamine in the body, which are called "pleasure hormones" and can regulate emotional states, alleviate symptoms of anxiety and depression, and improve personal happiness and satisfaction. In addition, physical exercise can improve sleep quality, enhance immune system function, reduce the occurrence of chronic diseases, and indirectly promote mental health. Xia *et al*. studied the impact of basketball and field hockey on the self-concept of adolescents and found that sports training had a positive effect on the development of self-concept [21]. Aerobic exercise can promote blood circulation, improve cardiovascular function, and increase oxygen supply and nutrient delivery to the brain. This physiological improvement helps alleviate the body's tense state, alleviate stress reactions, and thus reduce the occurrence of anxiety and depression. Participating in aerobic exercise is usually accompanied by setting goals, overcoming challenges, and gaining a sense of achievement. These psychological experiences help improve individuals' self-efficacy, self-esteem, and confidence, making them calmer and more composed when facing pressure and difficulties in life [22, 23]. Fang *et al*. analyzed the differences in physical exercise behavior, exercise volume, and exercise linearity between college students' mental health and learning life satisfaction through a survey on their physical exercise, mental health, and learning life satisfaction [24]. However, some scientists thought that physical exercise might also have a negative effect on mental health. At present, it is believed that unscientific physical exercise has negative effects on mental health, mainly including psychological fatigue and sports addiction [25].

Currently, how to fully utilize cloud storage technology and video surveillance technology to build an efficient and objective mental health monitoring platform to achieve real-time monitoring and accurate analysis of the psychological state of college students during physical exercise is still an issue at present. This study aimed to explore a new method for monitoring the mental health of college students by introducing cloud storage video surveillance processing technology to improve the efficiency and accuracy of mental health monitoring, provide strong support for mental health education in universities, promote the construction of campus informatization, facilitate the effective integration of campus business systems and teaching comprehensive management business systems, and create a better environment for the comprehensive development of college students. Through this proposed platform, behavioral data, facial expressions, heart rate, and other physiological indicators of college students during physical exercise could be collected and analyzed to more accurately evaluate their psychological state and provide a scientific basis for subsequent mental health interventions. This study innovatively applied cloud storage technology to the construction of large-scale video databases, reduced storage costs while ensuring service quality through the application of DCR algorithm, which successfully provided strong support for the construction and operation of campus psychological crisis monitoring system to achieve personalized emergency response to students' psychological crises. This study also provided new ideas and methods for the in-depth development of campus mental health education and useful references and inspirations for data storage and analysis in other fields.

Materials and methods

Data collection

A static survey was conducted to assess the psychological well-being of students by using PHQ-9 depression screening scale (https://www.apa.org/depression-guideline/patient-health-questionnaire.pdf) in this study, while the psychological state data was obtained through scores for psychological problems. The student behavior log data was collected through various systems on campus including teaching management systems, library borrowing systems, dormitory access control systems. All procedures were approved by the Ethic Committee of Zhengzhou College of Finance and Economics (Zhengzhou, Henan, China), and the informed consent form was obtained from all participants. All collected data were stored and processed in cloud storage devices for data mining, statistical analysis, and other methods to identify signs of psychological crisis among students. Considering the data dependency, data failure, fault recovery, and user response delay requirements of simulating data and data waiting queues in this study, a corresponding simulation environment architecture was designed using a 3.20 GHz Intel i5-3470 processor with 8 GB RAM and Python 2.7.3 (https://www.python.org/).

Construction of video surveillance cloud proxy storage system

The main function of cloud storage was to provide large-scale data storage services, while the distributed system was used for data calculation. Based on the cloud data storage structure, the distributed computing method was adopted, and relevant application software was applied to realize different types of data storage services, so that the data could be uniformly calculated. As a service, it provided users with various access interfaces to access cloud data. Cloud storage services provided basic and other data storage functions, but in different application fields, the storage needs were very different, and the usage habits of users and developers were also different. Therefore, the cloud service interface included a variety of user-friendly access interfaces including an IP address, a set of operation and maintenance, and management interfaces that connected users and upper business systems. The architecture of the proposed video surveillance cloud proxy storage system was shown in Figure 1.

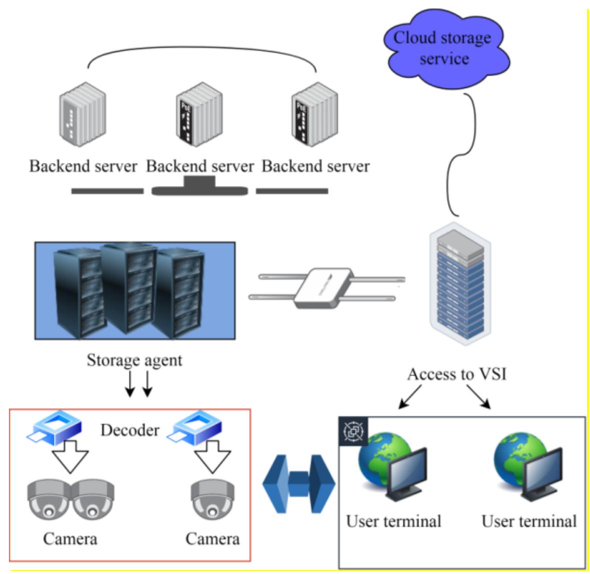

Figure 1. Cloud proxy storage system.

Data security and privacy protection were crucial in video surveillance systems. The cloud storage system ensured the security of video image data during transmission and storage by adopting advanced encryption technology, access control mechanisms, and data isolation strategies. Meanwhile, cloud service providers typically offered strict data protection policies and compliance certifications to meet the data security requirements of different industries. With the development of artificial intelligence and big data technology, cloud storage systems could also achieve intelligent video image analysis and processing, which could automatically identify abnormal events, track target objects, conduct behavior analysis, providing more accurate and efficient support for security monitoring. In addition, cloud storage systems also supported automated operation and maintenance management including fault warning, performance monitoring, resource scheduling, reducing the difficulty and cost of system operation and maintenance. Cloud storage technology also played an important role in optimizing surveillance video images. Surveillance videos belonged to streaming data, and their capacity was unpredictable during data generation. It was necessary to establish a storage cycle for surveillance videos to avoid storage issues caused by continuous data generation (Figure 2).

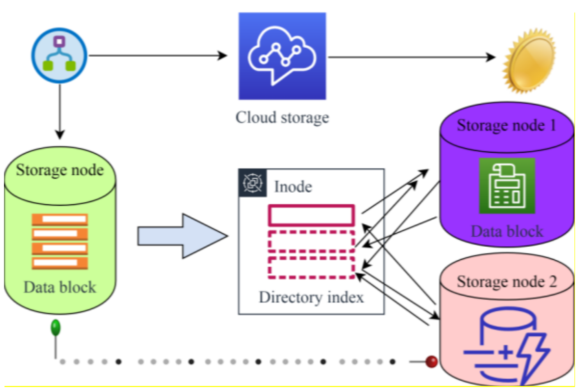

Figure 2. Cloud storage architecture adjustment.

As the central node for video data storage and management, cloud storage was combined with overall solutions to optimize video data management. All storage nodes for high-definition video data served as mutual backup and management nodes for application systems. The large-scale deployment of monitoring systems undoubtedly improved the disaster resistance of the entire solution system, ensuring the stability and reliability of the system. The video images were transmitted from the resources to the disk array in the cloud storage center for storage through the transmission network (Figure 3). The storage function of cloud platforms provided high-end data support for surveillance videos, effectively solving the problem of poor scalability caused by massive unstructured surveillance videos in traditional technology systems. The filtering function of the vice structure was applied to identify keyframe files containing the person in storing surveillance videos after collecting video technology. The only stored object data was generated through mapping calculations, and the unique representation of the object file was determined through masking and hashing calculations. The elastic storage algorithm was used to calculate the identifier of the file group and correct it. By uniformly randomly selecting from the filegroup, video surveillance data could be evenly distributed. Cloud storage, like distributed storage, used collaborative storage methods that collected a large amount of idle storage capacity in the network. Therefore, the application of cloud storage could effectively utilize high-performance computer resources in the network to solve the storage problem of massive video data. The application of storage cluster technology, system distributed file system, network computer, and other technologies could extract effective and redundant data, and compress or encrypt data that occupied a large space.

Algorithm

Through the application of virtual space, cloud computing could provide large storage space for the comprehensive application of the big data processing system, continuously improve its processing speed in the process of collecting data, and effectively ensure the simultaneous operation of the whole computer system. Using cloud computing to analyze big data could effectively take advantage of its strong compatibility and constantly improve the efficiency of data analysis. The proposed method first checked whether there were storage nodes in use. If the result was "Yes", the node with the largest available space that could meet the requirements of the first volume request v_1 at the left end of the volume set from the used storage nodes would be selected. Otherwise, a new storage node would be started. Once v_1 was

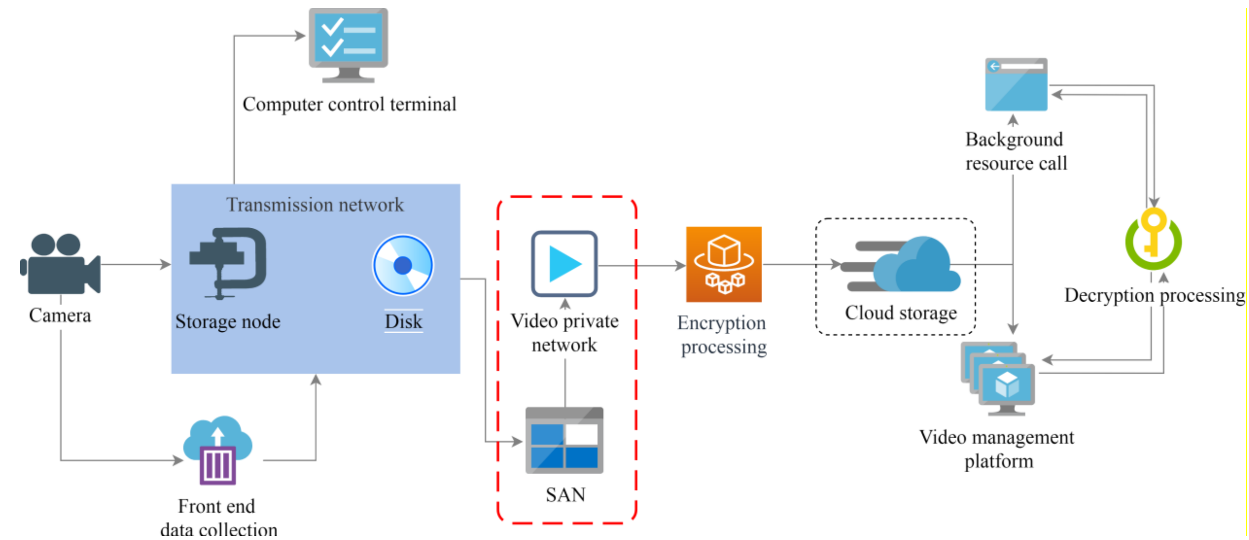

Figure 3. Cloud proxy storage system.

put into p_i , the following expression was obtained.

$$r_{1k} + r_{2k} + r_{mk} + \cdots + r_{nk} \leq s_{1i} \tag{1}$$

The cloud data was stored in a shared virtualization resource pool. The service provider would back up the entire storage resource pool to ensure continuous service. However, cloud data was not completely reliable. Due to the different reasons for the destruction of data blocks, the destruction of data at the block level might be continuous or discrete as below.

$$\min(P_{\text{used}} = \sum_{i=1}^{n} P_i) \tag{2}$$

When there was one center, two content servers, and multiple users, the user partial key with additional T information could be obtained by identifying the user group and the user's global identity code T to effectively prevent collusive attacks. On this basis, an anti-conspiracy attack solution was proposed when there were A content servers and B users as follows.

$$key = \sum_{i=1}^{A} y_A \tag{3}$$

$$\sum_{i=1}^{B} y_B, u_k \neq key \tag{4}$$

Then, different users still could not obtain the complete key required for decryption through collusion, that was, the partial key obtained by the user contained the identity information of the user. The time when the data blocks stored in the server were damaged was independent of each other and had no memory. If the data block N_i was extracted and verified in the round t sampling process and the block was not damaged, the time of damage followed the exponential distribution with the parameter ξ. If the block was damaged, the time when it was damaged again similarly followed the exponential distribution with the parameter ξ. The probability density formula of the time interval when the data block was damaged was obtained below.

$$f(\xi) = \xi e^{-\xi x}, x \geq 0 \tag{5}$$

Further, the average period of data block corruption was obtained as follows.

$$E(x) = \frac{1}{\xi}(\xi\rangle 0) \tag{6}$$

This sampling method improved the representation of the sample to the data as a whole and the accuracy of the verification results. Due to the diffusion mechanism, its advantages were particularly prominent in the face of continuous damage to data blocks. According to the normalization of probability, the following formulas were obtained.

$$p_{i,j} = 1 - p_{i+1,j+1} \tag{7}$$

$$\sum_{j=1}^{m} r_{jk} \cdot x_{ij} \le \sum_{i=1}^{n} s_{ik} \cdot y_i \tag{8}$$

where $i \in (1,2,\cdots,n), j \in (1,2,\cdots,m)$. Its dimensions as its attribute and target were within the allowable range of each attribute of a single storage entity.

$$\sum_{i=1}^{n} x_{ij} = 1 \tag{9}$$

According to the access characteristics of the data, only the first 1/P data blocks with the highest replacement cost were selected and placed at the head of the queue. The rest of the data were arranged in the LRU manner. After sorting was completed, if a certain number of pages needed to be swapped out of the cache, they were prioritized from the occasional queue. If the queue was empty occasionally, the data page at the end of the queue in the frequent queue was selected, and the cache was cleared as shown below.

$$C_{s1} = \sum_{i=1}^{n} M_1 \cdot \delta_1 \tag{10}$$

$$C_{s2} = \delta_1 \cdot N_1 + \delta_2 \cdot N_2 \tag{11}$$

It was necessary to standardize the selected eigenvalues and perform linear transformations on the original data with the formula below.

$$d(x_i, x_j) = \sqrt{\sum_{k=1}^{d} (x_{ik} - x_{jk})} \tag{12}$$

Because the number of copies of data under different storage strategies was different, the availability of data itself was also different. The availability of data under different storage strategies was calculated without considering the generation of data as follows.

$$E = \sum_{i=1}^{k} \sum_{p \in x_i} \left| p - m_i \right|^2 \tag{13}$$

By analyzing the correlation between the state of each independent data block and the damaged data block, the Random Markov decision process was used to formulate the extraction strategy of the data block in the verification to solve the problem of the detection time length of the simple random verification scheme when the data block was continuously lost or damaged. The cloud storage party first performed a self-test to divide the file into legal and illegal parts by calculating the check value of each file block and comparing it with the check value stored on the server. If they were the same, they would be placed in the legal group, otherwise in the illegal group. Because the self-test process was to improve the efficiency of verification and save the resources of the cloud storage provider, the linear combination of each user file was calculated below.

$$\phi_v = \sum_{i=1}^{c} v_i m_g + \phi_e \tag{14}$$

The zero-knowledge proof was used to prevent the verifier from obtaining the user's data. After receiving the feedback result, the legal grouping was mainly verified whether the following formula was correct.

$$e(\delta, \gamma) = \prod_{k=1}^{k} e(\prod_{i=c}^{c} |i-k|)^{v_i} \cdot u_k \tag{15}$$

Based on data dependency, when data was lost or inaccessible, it could be regenerated using other data. Source data could be regarded as a special “data copy”. Compared with previous data copies, its content was different and could not be copied directly, but it could be converted according to certain operators. Given this feature, the data dependency relationship was combined with the data copy, and the storage strategy with fewer copies was used for the unimportant data or the data with low access frequency.

Simulation tests

In the scenario of simulating data anomalies and regenerating, this study set the space sizes as 100 GB, 500 GB, 1,000 GB, while the duration was set to 2 h, 4 h, 6 h to simulate data requests of different scales and different time periods. The arrival rate was set to 0.001 Mbps, indicating the arrival speed of data requests, and the performance was set to 360 to represent some performance indicators of the simulation environment such as throughput, response time, *etc*. The scale of the data center was set to 28 nodes, representing the size and capacity of the data center in the simulation environment. Multiple feature values of the camera were recorded in the context of changing the data in the cache device to a disk device and specified that this interactive system used the copy function to perform underlying I/O operations. These feature values covered key information such as yesterday's and today's visit counts, regional importance, camera attributes, and video labels. The characteristic values were recorded as record 1 including yesterday's visit count as A11, today's visit count as B12, area importance as C13, camera attribute as D14, video tag as E15, while record 2 covered yesterday's visit count as A21, today's visit count as B22, area importance as C23, camera attribute as D24, video tag as E25, and record 3 involved yesterday's visit count as A31, today's visit count as B32, area importance as C33, camera attribute as D34, and the video tag the same as record 2 as E26. The adjustment of the experimental environment including the changing cache devices to disk devices and the underlying implementation of the system using replication functionality were emphasized, and the feature value records of the camera were detailed for subsequent experimental analysis and data processing. To reduce the computing load of data visitors, the attribute-based encryption mechanism and the cloud storage scheme were combined to develop an attribute-based cloud storage data encryption algorithm that could realize identity revocation under the cloud storage platform to further protect the important information of users in the access control policy and ensure the security of user data. When choosing cloud storage security solutions, the organization should ensure continuous monitoring and visibility for all forms of data interaction with cloud storage. It should provide fine control over file movement filtered to user agents and operating system events. Encrypted data was password-locked to the private key and could not be decrypted unless the private key was available. The authentication of the user’s identity and the management of the user’s access rights were no longer carried out by using the user’s global identity information as in identity-based encryption, but by determining the user’s rights according to the user’s attribute set. Although saving all data in high-speed equipment met the requirements of high performance, the storage space and the price made that less feasible. This proposed data hybrid storage method could make full use of the characteristics of various storage media, greatly improve the efficiency of high-performance equipment, and achieve the continuous storage of massive data through low-speed equipment with lower prices.

Results and discussion

Average space utilization of storage nodes

Assuming the system contained data with generative dependencies, if 87% of users accessed 15% of the data, the algorithm could only store a maximum of 8% of the data. However, when data access was relatively average and each data needed to be stored, the algorithm's optimization of data storage overhead was limited. Therefore, the

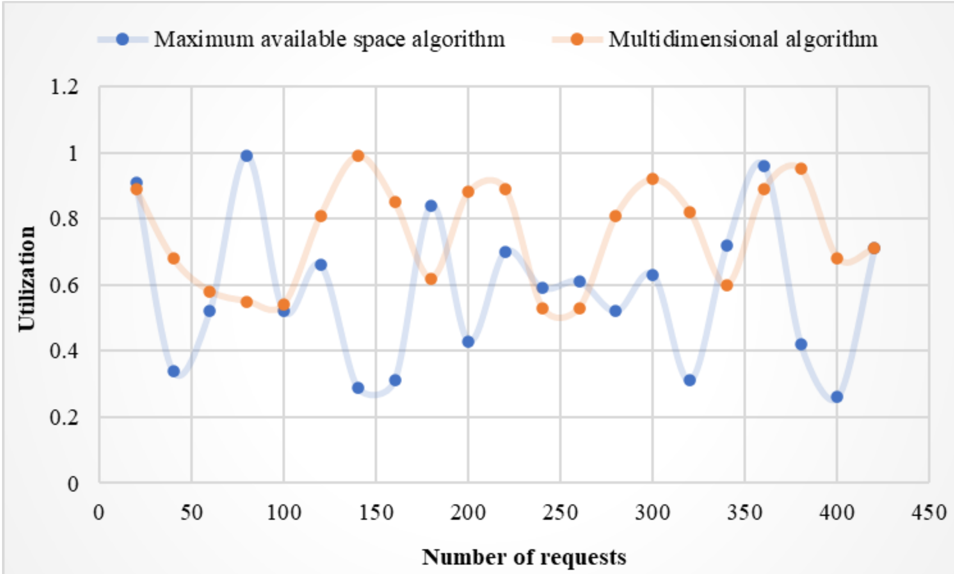

Figure 4. Average space utilization of storage nodes.

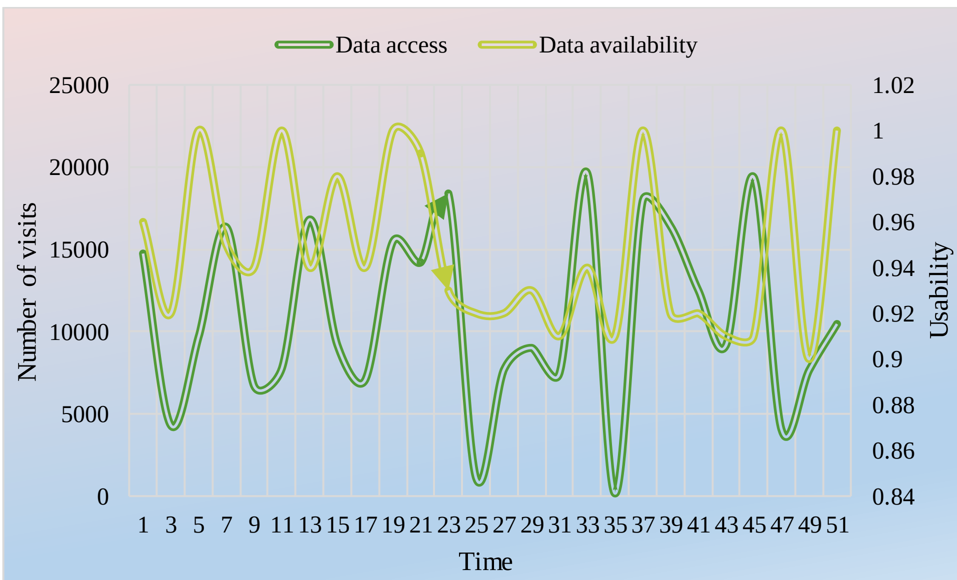

Figure 5. Data availability simulation test.

applicability of this algorithm was limited to situations where the distribution of user access varied greatly. The average space utilization of hosts under different volume requests and scheduling algorithms was shown in Figure 4 when there were multiple storage nodes. The block padding last recently used (BPRU) algorithm took the block as a unit, selected the least frequently accessed block to replace it, comprehensively considered the cost of data migration in the block, selected a replacement block and replaced it out of the cache, which could minimize the impact of flash memory device erasing operation on the overall performance. However, its hit rate was even more difficult to guarantee because its granularity was about 100 times that of the page replacement strategy. To ensure the availability of data, it was necessary to avoid data not being accessed when a node failed. Cloud storage systems would store multiple copies for each data. When one data copy was unavailable, it could use the other data copies to continue providing services (Figure 5). The results showed that, within the given time period, both "data access" and "data availability" demonstrated fluctuating changes. The "data access" frequency was relatively high, reaching a peak of 25,000, at the time units of 10, 20, 30, and 40, while, at the other time points, the frequency of data access decreased, but remained above a certain level. This fluctuation trend might reflect changes in user activity patterns, system load, or adjustments in data access policies. In contrast, the "data availability" showed a relative stable trend at a high level throughout the entire time period although there were fluctuations. The data availability reached maximum value between the time units of 25 and 35, which indicated that, during this period, the stability of the system or service was high, and users could reliably access the required data.

Data processing

This study included data like scores on mental health scales and behavioral log statistics that were presented in numerical form and unstructured data like video surveillance recordings. These data were usually stored in binary form and required specific processing and analysis techniques. To test and validate the proposed cloud storage-based psychological crisis monitoring method, the data were cleaned and organized from the mental health scale by removing invalid or abnormal records. The behavior log data were aggregated and classified, and key behavioral features were extracted. The video surveillance data such as frame extraction, face detection, and expression recognition were preprocessed before uploaded to the cloud storage platform to ensure the security and accessibility of the data. Reasonable data structures and indexing strategies were then designed to improve the efficiency of data queries and analysis. Data mining techniques were applied to discover the correlation between students' psychological crises and behavioral characteristics followed by statistical analysis to verify the significance and stability of these associations.

Comparison of different types of sampling

The simple random sampling, non-repetition sampling, and sampling based on the Random Markov decision process in data block destruction with different initial randomness of 0.1, 0.5, and 1.0 were compared (Figure 6). The results included changes in hit rate, replacement cost, and other related performance metrics over time or cache space. A relatively stable "simple spiral" growth trend with data block numbers ranging from 100 to 3,000 was observed in simple random sampling, while there was a slight decrease during the period of 1,400 - 2,700. This result indicated an increase in the data volume of the 'simple spiral', reflecting the strengthening of trends or patterns. The non- repetition sampling showed a relatively stable fluctuation trend during the period of 100 – 3,000 data blocks with a relatively small fluctuation amplitude. The complex fluctuation trend of Random Markov decision process during the period of 100 – 3,000 data blocks demonstrated both upward and downward trends with the maximum number of turns being reached at the number of data blocks reaching 1,650 and the average number of turns exceeding the levels of other two sampling methods.

Dynamic cost replacement (DCR) algorithm

A DCR algorithm was proposed based on the above analysis that indicated that the cache replacement algorithm must consider the hot spot migration of data and the change of access frequency. To verify the CPU utility, a comparative test for different cache sizes, different cache replacement algorithms, and different trace types were conducted. The intelligent analysis of video data was realized through the implementation of policy presetting and the application of relevant calculation methods and principles. The results showed the

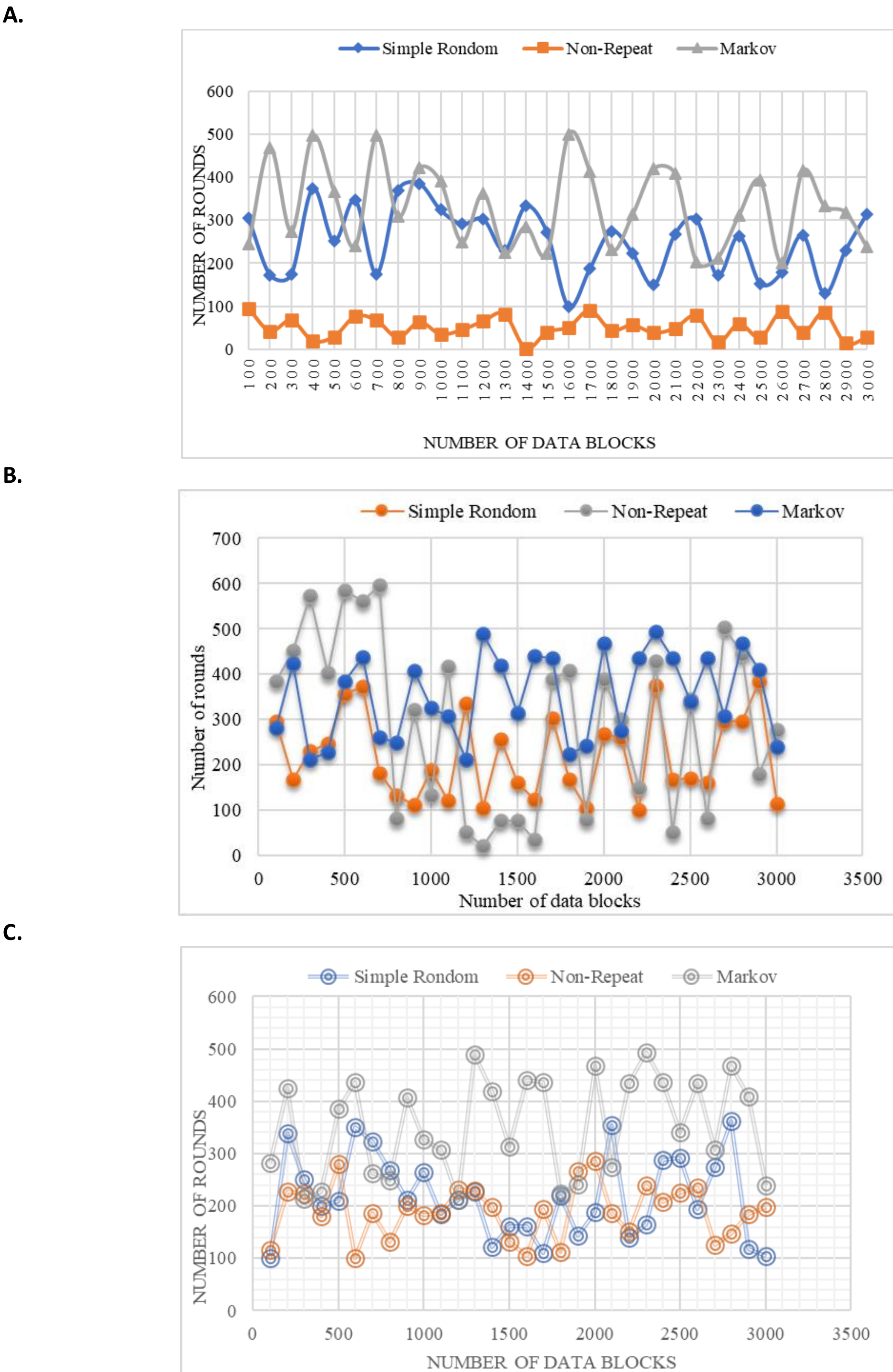

Figure 6. The number of sampling rounds (t) varied with the number of sampling blocks (c) when the initial randomness was 0.1 (**A**), 0.5 (**B**), and 1.0 (**C**).

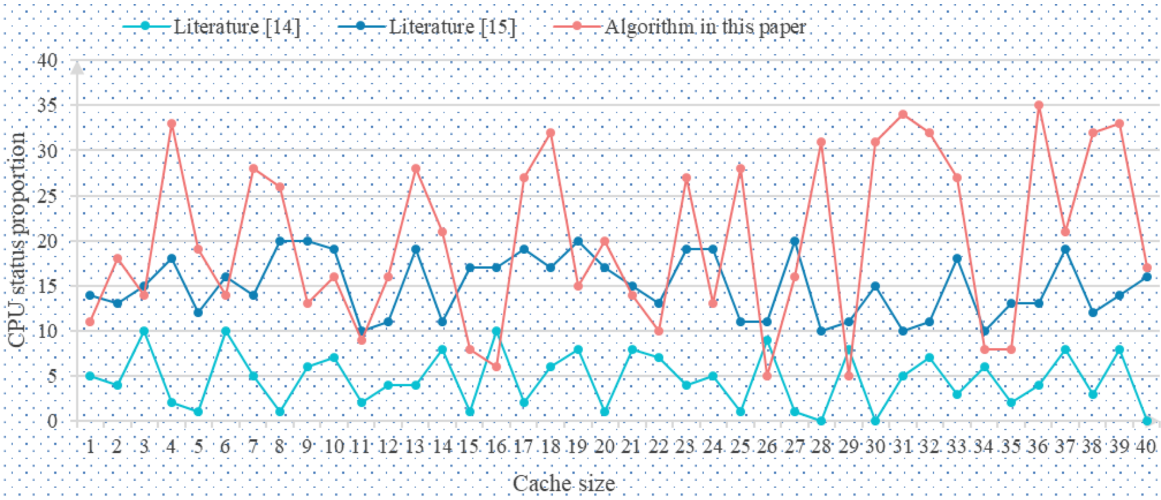

Figure 7. The proportion of CPU busy state time.

advantages of the DCR algorithm compared to other algorithms in terms of hit rate, dirty data writing efficiency, and CPU performance usage (Figure 7). The results suggested that, when data access requests were randomized and fragmented, regardless of the cache space, the DCR algorithm could significantly improve system performance by increasing hit rates and improving dirty data write efficiency. While ensuring hit rate and speed, the DCR algorithm did not overuse CPU performance or cause frequent flash erase operations. It did not excessively interfere with other virtual machines or processes running in the hybrid system, ensuring the lifespan of flash devices to a certain extent.

Establishing a sound management system and framework for mental health education is the key to ensuring effective implementation of work, which includes clarifying the goals of mental health education, planning reasonable educational content and forms, establishing professional teaching staff and counselling institutions, and improving psychological crisis intervention mechanisms. Through institutionalized management, the systematic, continuous, and effective nature of mental health education can be ensured, creating a safe, healthy, and positive growth environment for college students. Meanwhile, promoting the transformation of research methods for mental health education in universities is also an important task at present. Traditional mental health education often focuses on imparting theoretical knowledge and providing simple counselling for psychological problems, while modern mental health education emphasizes empirical research, case analysis, and effectiveness evaluation. By introducing interdisciplinary research methods such as psychology, education, and sociology, we can delve deeper into the laws and characteristics of college students' psychological development, providing a solid theoretical foundation and practical guidance for the innovation and development of mental health education. Through the results of this research, many functions of monitoring video management could be achieved and embedding real-time video surveillance software in the server could be possible. The massive video data stored in the cloud requires that the video data can be quickly retrieved. By analyzing and calculating massive amounts of data, intelligent analysis algorithms can be used to analyze video data based on expected predetermined strategies and calculation principles. Storage virtualization technology solves the unified management of storage capacity for various devices and dynamic partitioning of disk capacity, achieving flexible, intelligent, and automated management of storage devices and storage spaces. Big data analysis of surveillance videos can be combined with front-end intelligence and back-end analysis for data processing. Under normal circumstances, monitoring devices can generate intelligent structured data. Cloud storage technology requires the storage of surveillance video data and structured data to achieve effective segmentation of data and extraction of relevant information, which is used for data computation and analysis to effectively reflect the actual value of data information. In the development of future video surveillance systems, the application of cloud storage technology can not only provide intelligent detection, perception, and analysis, but also achieve automatic tracking of events, early warning of related events, and provide solutions, thereby providing better services for users. Overall, cloud storage technology has a broader and clearer development space in the future and is more suitable for application in the field of mental health management for college students by grasping students' psychological state and carrying out targeted educational activities. However, there are still educators who are unable to proficiently apply relevant data and information in their daily work. Therefore, constantly updating the knowledge structure of university staff is necessary to enhance their sensitivity to massive amounts of data information and improve their ability to analyze and process data.

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